the granular quartz is supposed to pervade the base of the mountain to an indefinite depth, the corrections, in proportion to the mere difference between the specific gravities assumed by Dr. Hutton and that found by experiment, were simple in comparison to those necessary on the second hypothesis; but in each case the attractions of opposite portions of the cylindrical sections became, in fact, unequal, and consequently required to be computed with due regard to their respective specific gravities, as well as the azimuth and altitude of each.

The nature of these computations is fully explained by the author, but cannot be understood without reference to the figures which accompany them. The resulting density deduced according to the first hypothesis is found to be nearly 4·56; that deduced by Dr. Hutton having been only 4·48: but according to the second hypothesis, the difference is far more considerable; the density in this case being 4·87.

This last is nearly a mean between that of Dr. Hutton and the density of 5·48, which Mr. Cavendish inferred from a very different mode of investigation.

By considering the experiments on Schehallien alone, the density of the earth might be assumed to be between the limits above assigned, the mean of which amounts to 4·71. Mr. Playfair, however, thinks it desirable that an element so important in physical astronomy should be the result of many experiments, and recommends the selection of granite mountains, if possible, for this purpose, because their homogeneity might be presumed with considerable confidence.

Observations and Experiments on Vision. *By* William Charles Wells, *M.D. F.R.S.* Read July 4, 1811. [*Phil. Trans.* 1811, *p.* 378.]

The experiments here described by Dr. Wells were made in consequence of an imperfection of sight occurring to his observation, which he has nowhere seen upon record. The subject to whom the disorder happened was a gentleman about thirty-five years of age, who, after a slight catarrh, had been seized with a degree of stupor, and weight of his forehead, accompanied with a paralytic state of the right eyelid. The pupil of this eye was also observed to be much dilated; and he had lost all power of adapting that eye to near objects, although he could see at a distance with great distinctness. The left eye also became shortly after affected in a slight degree, and in a similar manner.

The nature of the defect became evident by trial of spectacles; for it was found that convex glasses enabled him to read with perfect ease, and supplied the want of the power of adaptation which he had before possessed.

Since the application of the juice of belladonna to the eye occasions a dilatation of the pupil, it appeared to Dr. Wells not improbable that it might also affect other muscular powers of the eye. It was his intention to have made this experiment on his own eyes;

but he found their power of adaptation too far diminished by age for such a trial. He however prevailed on Dr. Cutting, a young physician of his acquaintance, to make trial of it. The result was perfectly conformable to the supposition. The dilatation of the pupil, it is true, commenced sooner than any other affection of the eye; but in the course of three quarters of an hour, the eye, which before the experiment could see at six inches, could not now see at less than three feet and a half: and when its pupil had acquired the greatest dilatation, the rays from a candle, even at eight feet distance, could not be made to converge on the retina, but only those from stars, or from very distant lamps. The defect thus occasioned by belladonna was found nearly in the same state on the following day; and it was not till the ninth day that the power of adapting the eye to near objects was completely restored. During the whole of this time it was observed that the affection was wholly confined to the left eye, on which the experiment was made, and that the right eye remained unaltered; and in the same manner, when the experiment was afterwards repeated on the right, the left was then wholly unaffected by the belladonna.

The next observations relate to the changes which naturally take place in different eyes by age. With respect to those who are short-sighted, it has been generally asserted by systematic writers, and generally believed by others, that their eyes are rendered fitter for seeing distant objects; but Dr. Wells has observed, in various instances, that this was not the case.

One gentleman, a fellow of this Society, who was short-sighted in early life, and consequently in the habit of using spectacles with concave glasses constantly, could see with them perfectly at a great variety of distances till he arrived at the age of fifty. But he then began to observe that distant objects viewed through the glasses to which he had been accustomed, were indistinct; and he found it necessary to use others which were more concave for seeing objects at great distances. But along with this change of his sight, another occurred of an opposite kind: for he now found, that when he wished to examine minute objects attentively, it was necessary to remove his spectacles entirely, and employ the naked eye alone. It was true, therefore, that, with respect to near objects, he *had* become longer-sighted, but in fact his range of vision was shortened equally at the opposite extreme, so that the mean is little altered from what it always has been.

In a second instance the variation produced by age in a short-sighted person was the same in kind, but not hitherto in so great degree.

In a few trials which Dr. Wells has made upon short-sighted persons with belladonna, the diminution of the range of adaptation has not taken place at both extremities, but the power of seeing near objects has alone been diminished.

He is not, however, altogether satisfied with these experiments; and designs to pursue them further, and at some future time to communicate the results to the Society.

In the course of these experiments Dr. Wells observes, that the sympathy between the eyes, which is in general considered as sympathy of the iris, is in fact sympathy of the retina; for when the pupil of one eye is dilated by belladonna, the pupil of the other becomes so much the more contracted, in consequence of the greater light which the enlarged pupil admits.

He remarks, also, that though he has lost, in great measure, the power of adaptation, he has in no degree lost any command of the external muscles, but can make the optic axes meet at any short distance from his face, to which he could formerly make them converge. So also, while Dr. Cutting's eyes were under the influence of belladonna, the powers of the external muscles remained unimpaired; whence it appears, that the power of adapting the eye to different distances is not dependent on the external muscles, but rather to be referred to the crystalline lens, although the muscularity of that organ does not appear to Dr. Wells to be by any means established.

On the Grounds of the Method which Laplace *has given in the second Chapter of the third Book of his* Mécanique Céleste *for computing the Attractions of Spheroids of every Description. By* James Ivory, *A.M. Communicated by* Henry Brougham, *Esq. F.R.S.* Read July 4, 1811. [*Phil. Trans.* 1812, *p.* 1.]

Sir Isaac Newton, who first considered the figure of the earth and planets, confined his view to the supposition of their having been originally in a fluid state; and he conceived them to retain the same figure which they assumed in their primitive condition; and those mathematicians who succeeded him in the same path of inquiry have seldom ventured beyond this limited hypothesis, and have shown, that when a body composed of one uniform fluid revolves about its axis, or even if it consists of several fluids of different densities, its parts will be in equilibrium, and it will preserve its figure when it has the form of an elliptic spheroid of revolution oblate at the poles.

But though the supposition of original fluidity of the mass simplifies the investigation, it does not seem to be warranted by what we see of the surface; for in that case, Mr. Ivory observes, the arrangement of all the heterogeneous matters would have been according to their densities; those least dense occupying the surface with gradual increase of density to the centre; whereas, on the contrary, nothing can be more irregular than the density of such solid parts of the earth as come under our observation, and the elevation of continents above the level of the sea, as well as the depths of the different channels which contain the waters of the ocean.

Moreover, according to the latest and best observations made for the express purpose of determining the figure of the earth, it does not appear to be of any regular elliptic form.

Since the hypothesis of Newton is, therefore, not consonant to observation, it became necessary to consider the subject in a more